

CLAIM AMENDMENTS

This listing of claims reflects all claim amendments and replaces all prior versions, and listings, of claims in the application (material to be inserted in amended claims is in underline, and material to be deleted is in ~~strikeout~~).

1. (Currently Amended) A fuel cell system, comprising:

a fuel processing assembly adapted to produce a product hydrogen stream containing at least substantially pure hydrogen gas from at least one feed stream that comprises at least a carbon-containing feedstock;

an air delivery system adapted to receive an air stream having a concentration of oxygen gas and to produce therefrom an oxygen-enriched stream having a greater concentration of oxygen gas than the air stream, wherein the air delivery system includes at least one oxygen-enrichment assembly adapted to produce the oxygen-enriched stream from the air stream, and further wherein the oxygen-enrichment assembly includes at least one oxygen-selective membrane;

a fuel cell stack adapted to receive at least a portion of the product hydrogen stream and the oxygen-enriched stream and to produce an electric current therefrom; wherein the fuel cell stack is adapted to emit a cathode exhaust stream containing water; and

a water-recovery assembly adapted to receive the cathode exhaust stream and to produce a product water stream therefrom.

2. (Original) The system of claim 1, wherein the at least one feed stream further comprises water.

3. (Original) The system of claim 2, wherein the product water stream forms at least 50% of the water present in the at least one feed stream.

4. (Cancelled)

5. (Cancelled)

6. (Currently Amended) The system of claim 51, wherein the product water stream forms at least 50% of the water present in the at least one feed stream.

7. (Currently Amended) The system of claim 51, wherein the fuel processing assembly is adapted to produce the product hydrogen stream by steam reforming of the at least one feed stream.

8. (Original) The system of claim 1, further comprising at least one separation region adapted to selectively reduce the concentration of impurities present in the product hydrogen stream.

9. (Original) The system of claim 1, wherein the oxygen-enrichment assembly is adapted to selectively remove at least nitrogen gas from the air stream.

10. (Original) The system of claim 1, wherein the oxygen-enrichment assembly is adapted to separate the air stream into the oxygen-enriched stream having a greater concentration of oxygen gas than the concentration of oxygen gas in the air stream and an oxygen-depleted stream containing a greater concentration of nitrogen gas than present in the air stream.

11. (Cancelled)

12. (Cancelled)

13. (Original) The system of claim 1, wherein the oxygen-enrichment assembly is adapted to produce an oxygen-enriched stream containing at least 30% oxygen.

14. (Cancelled).

15. (Cancelled)

16. (Original) The system of claim 1, wherein the oxygen-enrichment assembly is adapted to produce an oxygen-enriched stream having a concentration of oxygen gas that is at least 50% greater than the concentration of oxygen gas in the air stream.

17. (Cancelled)

18. (Cancelled)

19. (Original) The system of claim 1, wherein the water-recovery assembly is adapted to deliver the product water stream to a potable water supply.

20. (Original) The system of claim 1, wherein the fuel processing assembly is adapted to receive and utilize at least a portion of the at least one feed stream and at least a portion of the product water stream.

21-26. (Cancelled)

27. (Currently amended) A method for operating a fuel cell system, the method comprising:

receiving an air stream having a concentration of oxygen gas; producing from the air stream an oxygen-enriched stream containing a higher concentration of oxygen gas than the concentration of oxygen gas in the air stream, wherein the producing step occurs in at least one oxygen-selective membrane assembly adapted to receive the air stream and to produce therefrom the oxygen-enriched stream and a byproduct stream having a lower concentration of oxygen gas than the concentration of oxygen gas in the air stream;

delivering the oxygen-enriched stream to a cathode region of a fuel cell stack adapted to produce an electric current and water from the oxygen-enriched stream and a fuel stream, wherein the fuel cell stack is adapted to exhaust at least a cathode exhaust stream containing water;

recovering water from the cathode exhaust stream; and utilizing at least a portion of the recovered water to produce additional fuel for the fuel stream.

28. (Original) The method of claim 27, wherein the fuel is hydrogen gas and the fuel stream contains at least substantially pure hydrogen gas.

29. (Original) The method of claim 27, wherein the producing step includes producing an oxygen-enriched stream containing at least 30% oxygen.

30. (Cancelled)

31. (Original) The method of claim 27, wherein the producing step includes producing an oxygen-enriched stream having a concentration of oxygen gas that is at least 50% as great as the concentration of oxygen gas in the air stream.

32. (Cancelled)

33. (Original) The method of claim 27, wherein the fuel is hydrogen gas, the fuel stream includes at least water, and the utilizing step includes producing hydrogen gas from at least one feed stream, with the at least one feed stream including water recovered from the cathode exhaust stream.

34. (Original) The method of claim 33, wherein the at least one feed stream further comprises at least one carbon-containing feedstock.

35. (Original) The method of claim 34, wherein the utilizing step includes producing hydrogen gas by steam reforming water and the at least one carbon-containing feedstock.

36. (Currently amended) ~~A method for operating a fuel cell system, the method comprising:~~ The method of claim 27, wherein the utilizing includes producing the additional fuel from at least one feed stream comprising the portion of the recovered water and at least one carbon-containing feedstock ~~a product hydrogen stream~~ in a hydrogen-producing region of a fuel processing assembly;

~~receiving an air stream having a concentration of oxygen gas;~~
~~producing from the air stream an oxygen enriched stream containing at least 50% greater concentration of oxygen gas than the concentration of oxygen gas in the air stream;~~

~~delivering at least a portion of the product hydrogen stream to an anode region of a fuel cell stack and at least a portion of the oxygen-enriched stream to a cathode region of a fuel cell stack;~~

~~producing water and an electric current from the portions of the product hydrogen stream and the oxygen-enriched stream in the fuel cell stack;~~

~~exhausting from the cathode region a cathode exhaust stream containing water;~~

~~recovering water from the cathode exhaust stream; and~~

~~delivering water recovered from the cathode exhaust stream to the hydrogen-producing region as at least a portion of the at least one feed stream for the production of additional amounts of the product hydrogen stream.~~

37-43. (Cancelled)

44. (New) The system of claim 1, wherein the oxygen-enrichment assembly is adapted to at least selectively reduce the concentration of air pollutants from the air stream.

45. (New) The system of claim 1, wherein the oxygen-enrichment assembly is further adapted to produce from the air stream a byproduct stream having a lower concentration of oxygen gas than the air stream, and further wherein the system is adapted to utilize the byproduct stream to pressurize a supply of liquid fuel.

46. (New) The system of claim 45, wherein the feed stream includes fuel from the supply of liquid fuel, and further wherein the fuel includes at least one carbon-containing feedstock.

47. (New) The method of claim 27, wherein the oxygen-enrichment assembly is adapted to at least selectively reduce the concentration of air pollutants from the air stream.

48. (New) The method of claim 34, wherein the method further comprises pressurizing a supply of liquid fuel with the byproduct stream.

49. (New) The method of claim 48, wherein the at least one carbon-containing feedstock includes a fuel from the supply of liquid fuel.

50. (New) A fuel cell system, comprising:

a fuel processing assembly adapted to produce a product hydrogen stream containing at least substantially pure hydrogen gas from at least one feed stream comprising at least a carbon-containing feedstock;

an air delivery system adapted to receive an air stream having a concentration of oxygen gas and to produce therefrom an oxygen-enriched stream having a greater concentration of oxygen gas than the air stream, wherein the air delivery system includes at least one oxygen-enrichment assembly adapted to produce the oxygen-enriched stream from the air stream;

a fuel cell stack adapted to receive at least a portion of the product hydrogen stream, the oxygen-enriched stream and a secondary air stream and to produce an electric current therefrom, wherein the fuel cell stack is adapted to emit a cathode exhaust stream containing water; and

a water-recovery assembly adapted to receive the cathode exhaust stream and to produce a product water stream therefrom.

51. (New) The system of claim 50, wherein at least the oxygen-enrichment assembly includes at least one pressure swing adsorption assembly adapted to produce the oxygen-enriched stream from the air stream.

52. (New) The system of claim 50, wherein the oxygen-enriched stream and the secondary air stream are received by the fuel cell stack as a mixed air stream.

53. (New) The system of claim 50, wherein the oxygen-enriched stream and the secondary air stream are received by the fuel cell stack as separate air streams.

54. (New) The system of claim 50, wherein at least the oxygen-enrichment assembly includes at least one oxygen-selective membrane assembly adapted to produce the oxygen-enriched stream from the air stream.

55. (New) The system of claim 50, wherein the at least one feed stream further comprises water from the product water stream.

56. (New) The system of claim 50, wherein the fuel processing assembly is adapted to produce the product hydrogen stream by steam reforming of the at least one feed stream.

57. (New) The system of claim 50, further comprising at least one separation region adapted to selectively reduce the concentration of impurities present in the product hydrogen stream.

58. (New) The system of claim 50, wherein the oxygen-enrichment assembly is adapted to produce an oxygen-enriched stream containing at least 30% oxygen.

59. (New) The system of claim 50, wherein the water-recovery assembly is adapted to deliver the product water stream to a potable water supply.

60. (New) The system of claim 50, wherein the oxygen-enrichment assembly is adapted to at least selectively reduce the concentration of air pollutants from the air stream.

61. (New) A fuel cell system, comprising:

a fuel processing assembly adapted to produce a product hydrogen stream containing at least substantially pure hydrogen gas from at least one feed stream, wherein the at least one feed stream includes a carbon-containing feedstock from a supply of liquid fuel;

an air delivery system adapted to receive an air stream having a concentration of oxygen gas and to produce therefrom an oxygen-enriched stream having a greater concentration of oxygen gas than the air stream and a byproduct stream having a lower concentration of oxygen gas than the air stream, wherein the air delivery system includes at least one oxygen-enrichment assembly adapted to produce the oxygen-enriched stream from the air stream, and further wherein the byproduct stream is used to pressurize the supply of liquid fuel;

a fuel cell stack adapted to receive at least a portion of the product hydrogen stream and the oxygen-enriched stream and to produce an electric current therefrom; wherein the fuel cell stack is adapted to emit a cathode exhaust stream containing water; and

a water-recovery assembly adapted to receive the cathode exhaust stream and to produce a product water stream therefrom.

62. (New) The system of claim 61, wherein the oxygen-enrichment assembly includes at least one oxygen-selective membrane.

63. (New) The system of claim 61, wherein the at least one feed stream comprises water from the product water stream.

64. (New) The system of claim 61, wherein the fuel processing assembly is adapted to produce the product hydrogen stream by steam reforming of the at least one feed stream.

65. (New) The system of claim 61, wherein the oxygen-enrichment assembly is adapted to selectively remove at least nitrogen gas from the air stream.

66. (New) The system of claim 61, wherein the oxygen-enrichment assembly includes at least one pressure swing adsorption assembly adapted to produce the oxygen-enriched stream from the air stream.

67. (New) The system of claim 61, wherein the water-recovery assembly is adapted to deliver the product water stream to a potable water supply.

68. (New) The system of claim 61, wherein the oxygen-enrichment assembly is adapted to at least selectively reduce the concentration of air pollutants from the air stream.